BEDSIDE MEDICINE FOR BEDSIDE DOCTORS

An Open Forum for brief discussions of the workaday problems of the bedside doctor. Suggestions of subjects for discussions invited.

WHAT IS TO BE EXPECTED OF BLOOD TRANSFUSIONS

I. INDICATIONS FOR BLOOD TRANSFUSIONS IN SURGICAL PATIENTS

LeRoy Brooks, M.D. (2000 Van Ness Avenue, San Francisco).—In the not too distant past, blood transfusions were used only in extreme emergencies. This idea still persists in the minds of many patients and their families. Too often, when a blood transfusion is mentioned, the impression is created that death is lurking around the corner. Indications for transfusions in surgical patients today are quite sharply defined, often prophylactic in nature, and may be grouped as follows:

1. Shock due to hemorrhage, accidental or operative trauma, or toxemia.
2. Acute infections.
3. Chronic infections.
4. Poor surgical risks.
5. Blood dyscrasias requiring surgery.

We now know, in shock, that a physiological state exists in which there is an insufficient amount of blood in circulation. The plasma migrates through the capillaries into the body tissues. In severe shock, if the volume of circulating fluid is furnished by saline, glucose or other crystaloid solution, this thin liquid rapidly passes through the capillaries, and will not sustain a satisfactory volume of circulating fluid. A colloidal type of solution must be used with molecules sufficiently large to prevent it from passing through the injured capillaries too readily. Gum acacia solution with glucose is preferable to the crystaloid solutions, but large volumes of whole blood must be given first place.

Transfusions offer the most dramatic results in patients in shock from the simple loss of blood without extensive tissue injury. Such incidences are not infrequent in maternity cases or in accidental hemorrhage from operations, when the source of the hemorrhage has been stopped. Patients unconscious from such hemorrhage, if blood is given immediately, will often regain consciousness during the transfusion. From 500 to 1,000 cubic centimeters quantities are usually needed and may have to be repeated.

In shocked patients from accidental or operative trauma, the response to transfusions is not always so satisfactory as in the cases of simple hemorrhage. This is due to the fact that the cause of the shock, tissue injury, is continuing to act. However, large transfusions repeated offers the best chance for recovery and, if given early, will prove successful in many cases which would otherwise terminate in a fatality.

Of great interest is the type of case in which there is a massive concealed hemorrhage—that is, a hemorrhage that cannot be definitely located so as to mechanically control the bleeding. Gastro-intestinal hemorrhages or lung hemorrhages offer good examples of this type. We have had many discussions with internists who, in such cases, feared the giving of blood on the basis that the increased volume would cause an aggravation of the hemorrhage. We agree fully that the circulating volume of fluid should not be increased by giving solutions such as glucose. Our experience, however, forces us to the conclusion that when a patient is approaching the state of shock from a concealed hemorrhage, the whole blood transfusion will replenish the volume of fluid and tend to stop the hemorrhage. The explanation which we offer for this is the increase in the coagulation of the blood following the transfusion. Whether this explanation is correct or not, clinically, transfusions do not cause an increase in the bleeding in such cases. In such cases, donors should be kept in readiness, and if the blood pressure falls below 80, a transfusion should be given immediately. A second donor should be kept in readiness, and even a third to keep the patient's blood pressure above 80, preferably above 100, and ward off destruction of the vital centers. We have given, with success, as many as six blood transfusions within one twenty-four hours, infusing altogether more than 3,000 cubic centimeters of blood. Care must be exercised that all donors and the patient are of the same type when such large quantities of blood are given. At times, in these desperate cases radical measures must be resorted to, and the element of time is extremely important.

If the patient is in shock from the absorption of toxins from an overwhelming infection, blood transfusions are of practically no value. It is encouraging to note that transfusions as a last resort, just to satisfy the family and friends when there is no chance of their having any beneficial effect, are not so often resorted to in these modern times as previously. The results of this type of practice accomplish nothing of good, and only serve to discredit one of our most effective methods of treatment.

Some of the severe surgical infections with or without definite localization, with high temperatures, evidence of lack of normal resistance against the given infection, even in the absence of anemia, blood transfusions in small doses, 200 to 300 cubic centimeters given daily or every second day, are of unquestionable value. We are definitely of the opinion that it is far more valuable than the use of the so-called antistreptococcic serum, "prontosils," magnesium sulphate, hydrochloric acid, and myriads of other solutions that are used on an empirical basis. A good example of this type of septicemia is seen particularly in children, from ear or mastoid

or lateral sinus infections. A blood transfusion increases the patient's resistance, furnishes needed food and, no doubt in many instances, makes it possible for the patient to localize or overcome the generalized infection.

Patients suffering from subacute or chronic suppurative processes present a group of people to whom transfusions offer much. Along with other supportive treatment, repeated small blood transfusions should be used once or twice a week to keep the hemoglobin above a minimum of sixty. It is not uncommon to see patients with prolonged suppurative processes, such as in bronchopneumonia, empyema, lung abscess, subdiaphragmatic abscess, liver abscess, protracted peritonitis, osteomyelitis and other types of prolonged surgical infections, develop a marked secondary anemia. Such patients, if transfused, will often recover; but if not transfused, not infrequently will not recover.

The bone marrow and blood-forming tissues must be adequately nourished and oxygenated, in order to meet the added call due to the additional destruction of the blood by the infection. Besides making recovery more certain, if the hemoglobin is kept up, these patients will develop fewer complications, have a shorter convalescence, and recover with greater certainty and less morbidity. It is our experience in chronic infections that repeated small blood transfusions, from 200 to 300 cubic centimeters, are preferable to the larger transfusions of 500 cubic centimeters or more. However, if the patient is anemic, with a hemoglobin below forty when first seen, at the first or even the second transfusion, a full 500 cubic centimeters may be preferable, and subsequent blood be given in small quantities. It is remarkable indeed to see pale, unhealthy, indolent type of surgical wounds, which are healing slowly with an excessive amount of production of scar tissue, change their color and develop normal, healthy-appearing granulation tissue, and the healing process proceed with greater rapidity. It is probably in this group of patients that blood transfusions, when judiciously used, are most useful. It is our experience that this group of patients now receives blood transfusions more often than in the past. However, truth forces the statement that in some quarters, as yet, there is considerable lethargy in giving transfusions as often as they are indicated.

A fourth group of patients to whom blood transfusions are of great value are the poor surgical risks. One doing any volume of general surgery quite infrequently encounters a patient who must be operated upon and is not a good risk. Time and space do not present an opportunity for full discussion of the broad use that can be made of blood transfusions in this group. Good examples are bowel resection, gastric resection, thoracoplasty, lung surgery, pyloric stenosis in starved infants, and numerous other necessary major surgical procedures that must be carried out, particularly in children and people past the middle age of life.

Here again it can be said without fear of contradiction that, in general, transfusions in these cases are not used as often as the good results obtained by the giving of blood warrants. There is no other single procedure which can be compared with the use of transfusions in the preoperative preparation and the postoperative convalescence in the poor surgical risk. A good working rule to adopt is, that when the surgeon begins to consider giving the patient a transfusion, that is the time to give the blood.

The fifth or final group of surgical patients requiring transfusions are those unfortunates suffering from blood dyscracias with a tendency to bleed. It is, fortunately, true that there are not many such cases. Occasionally, one is forced to operate upon such people, and the question of hemorrhage is a major one. For example, we might mention thrombocytopenic purpura and other less well-classified hemorrhagic dyscracias requiring surgery. It is even possible to do surgery on a hemophiliac, if the patient is given adequate transfusions.

The reader no doubt is struck by the enthusiasm expressed for transfusions. For this enthusiasm to be justified every care must be exercised in the selection of donors. Both grouping- and cross-agglutination tests must be a routine, and the possibility of transmitting syphilis and malaria must be conscientiously guarded against. We prefer whole blood when given with dispatch, but a citrate transfusion well done is preferable to a whole-blood transfusion poorly done.

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II. INDICATIONS AND CONTRAINDICATIONS FOR THE USE OF TRANSFUSIONS IN CHILDHOOD DISEASES

HOWARD R. COODER, M. D. (3875 Wilshire Boulevard, Los Angeles). — The following statements are an attempt to present the evidence for and against the transfusion of blood in the diseases of children. The experiences upon which these statements are based have been gathered almost entirely at the Los Angeles Children's Hospital. About two years ago, when transfusions were at their height of popularity in this hospital, a reaction of inquiry into the value of this therapy began. The results given here are the deductions and the beliefs of this writer, and not necessarily an agreement among all the physicians upon the staff of this hospital. Such beliefs have been derived partly by the statistical method, when it could be used, and in part have been built up as clinical impressions.

More than one thousand transfusions are covered by these observations. The method of transfusion used has been the direct syringe technique, and in no case has a citrated transfusion been given. This is an important difference because the citrate method is slower and does not produce the sudden load which is added to the blood stream when the direct syringe method is used. On the other hand, citrate reactions have been avoided.

CONDITIONS IN WHICH TRANSFUSION IS OF CERTAIN BENEFIT:

1. *Acute Loss of Blood, Such as Accidental Hemorrhage.*—Transfusion is necessary only when enough blood has been lost to cause physical embarrassment. Transfusion is not necessary for small

hemorrhages, because such small blood losses will be quickly made up by the blood-forming organs without assistance. The loss of fluid can be replaced by subcutaneous or intravenous saline administration.

2. *Severe Anemia.*—By this is meant a dangerous situation in which the hemoglobin has dropped to 30 or 20, or lower, and the blood cells have dropped to a like degree. Such an anemia might improve by other methods if given enough time; but the patient's general condition may be so threatening that he needs the quick assistance of a transfusion in order to add at least 10 to 20 per cent to his normal blood count and hemoglobin.

3. *Septicemia, With or Without Anemia.*—If one can be sure that the blood of the donor contains antibodies which are specific for the disease, and that there is a sufficient amount or titer of these antibodies in the blood of the donor to be really helpful, then a transfusion for this purpose is definitely indicated. If the patient's blood culture shows that he is suffering from septicemia due to certain streptococci—for instance, as a complication of scarlet fever or of otitis media—then the patient would better be given a transfusion of immune serum rather than the blood of a casual donor. It is possible to obtain from certain serum centers a well-prepared and well-tested serum whose antibody strength against the bacteria involved is known. The whole question of transfusion for septicemia is in dispute; it is usually a measure of last resort. The only way that its value can be stated is to know the antibody properties of the blood which is available from donors.

4. *Purpura, Primary or Secondary.*—Transfusion may be given when the patient's platelets are low and there is serious hemorrhage. By adding normal platelets, the hemorrhage will be stopped at least for a time. Repeated transfusions should not be given, because they will depress the platelet output of the hematopoietic system. Transfusion should be given only if the cellular elements are low. It is usually indicated in symptomatic purpura rather than in the essential type.

5. *Hemophilia.*—In this condition transfusion is clearly indicated, and may have to be frequently repeated as a life-saving measure. Transfusion furnishes normal platelets, which are able to break down quickly and assist in the formation of the clot required to stop bleeding. These normal platelets, of course, soon disappear, and transfusion will have to be repeated if the patient has another attack of bleeding which cannot be stopped by other methods.

6. *Leukemia.*—This is always a fatal disease in children. The patient may be kept alive for a certain time by transfusions which no other form of treatment will afford. Transfusions are given, time after time, when the patient's blood reaches a sufficiently low level in order to keep him alive for the sake of the family. More transfusions are given in this disease than in any other. The patient will sooner or later die, although the end may be deferred for months. In the case of a child, it is doubtful whether, for any other reasons than sentimental ones, it is worth while to prolong the patient's precarious and unsatisfactory life in this manner.

7. *Shock.*—In this condition, where a part of the blood of the body stagnates in a certain so-called "pool," fluid must be added to the blood volume of a kind that will remain in the vessels and restore the blood pressure. The transfusion of blood fulfills these needs and is of decided benefit.

CONDITIONS IN WHICH TRANSFUSION IS OF DOUBTFUL VALUE:

1. *Pneumonia.*—Transfusion is very much used in severe cases of pneumonia. The thought back of this usage is that normal blood or serum will furnish some kind of stimulus or antitoxic property to overcome the toxemia. In the observation of this writer, transfusion for the toxic type of pneumonia has seldom or never been of any help to a patient, and has sometimes done harm. If the blood shows severe anemia and depletion, transfusion may be called for just as it would be in any other severe blood loss. In severe toxemia with cyanosis and involvement of the nervous system, transfusion does no good. In collapse of the vasomotor system, transfusion is probably wrong, because the capillaries are engorged with blood due to reasons which have nothing to do with the blood itself, so that to add other blood at this time may only increase the undesirable condition. If the patient's poor condition is due to a failing heart, then it does not seem rational to put an additional amount of blood into the vessels, because we are not at all sure that the heart muscle will be stimulated by anything in this new blood, and to increase the blood volume will probably further embarrass the heart. If the heart is overworking and the pulse bounding, this is probably the time for venesection and the additional load of new blood is distinctly contra-indicated. Infants who are very ill with pneumonia frequently need intravenous saline solution to repair their dehydration, rather than the scanty fluid content of a small transfusion. Statistics, which deal with the value of any kind of treatment in relation to pneumonia, must be carefully gathered and interpreted. So far as observations in this hospital are concerned, transfusion for pneumonia in children has seemed to be associated with a higher death rate.

2. *Enterocolitis.*—This is a common and a serious condition in very young children, both in hospitals and in private practice. The patients lose more fluid than can be put into them, and rapidly become very ill and subject to complications. The death rate is high, and a large percentage die with pneumonia as a terminal complication. Consequently, enterocolitis and pneumonia have to be considered together, as it is often impossible to say which is the greater illness. The first and greatest requirement here is fluid replacement, and the most valuable recent addition to our methods of treatment is the intravenous drip of normal saline. Transfusion has been much used during the height of this disease and as a measure of last resort. The chief thought lying behind this therapy is that the fresh serum contains some restorative quality. It is the

opinion of this writer and of others on the staff of this hospital that transfusion has not helped in the mass of cases with enterocolitis. If severe anemia has been produced by the toxemia, a small blood transfusion may be given, but even then a transfusion of serum may be better. Blood cultures should frequently be made, and if positive for certain kinds of streptococci, serum which contains antibodies for these organisms may be given. Its use has apparently saved some lives.

3. *Postinfection, Depletion and Prostration.*—Transfusion is frequently used in the state of depression which follows a severe infection. The reasons given by those who employ it are not always clear. It is frequently referred to as a "boost." If the patient is severely anemic, a transfusion may be allowed; but it seems to be of value only to the exact extent of the amount of blood which is added, never more than 10 or 20 per cent of the patient's total blood volume. Many patients who have been severely ill will be depressed in various ways for weeks and months; children frequently show a persistent fatigue. It appears that what these patients need is chiefly rest, no matter how long it takes, and food, and an improvement in their mental and physical hygiene plus an iron tonic. Antibodies and the other restorative factors of fresh serum, which a transfusion is supposed to furnish in this condition, are extremely doubtful unless the donor's blood is tested. It is better to use a known immune serum. In certain convalescent conditions the patient's blood shows an increased tendency to clot, and to add new blood at this time will create a hazard of thrombosis. Patients have sometimes died during or soon after transfusions for reasons that are unexplainable, and seem to have something to do with a sudden coagulation and obstruction of capillaries.

4. *Leukopenia.*—This condition is found in children as a result of the use of arsenic preparation and a few other drugs, but most commonly as the result of chronic or acute infections. It is not very uncommon and it may become more common. These patients are very ill, and transfusions are given as emergency treatment. The question is always asked, is the patient ill because of a low white count or is the white count low because of the main illness? Transfusions depress the blood-forming system for a time and decrease the white count as a rule, although they may occasionally increase it. The reticulocytes are decreased. It is a common observation that blood counts done every day after a transfusion will show that the blood elements stand still. In leukemia a transfusion causes the white count to drop. If these things are so, then it is not rational to give a transfusion for leukopenia, because the white count is apt to drop still lower. In spite of the above contraindications, the patient may have to be transfused if necrosis of throat tissues threatens to occur.

5. *Surgical — Preoperative and Postoperative States.*—Transfusion is very popular with some surgeons, and is given as a routine measure by them. The reasons advanced are often not satisfactory, and are not founded on any known requirement, but seem to depend upon the empirical beliefs of these surgeons. The need of such transfusions is doubtful, and their value is impossible to measure. One nose and throat surgeon may give a transfusion before all of his mastoid operations, while another surgeon may never use it and the ultimate results in the two groups of patients will be the same. One example of irrational procedure may be cited—that of giving a transfusion before or after a brain operation. In this condition, with the many delicate ligatures of brain vessels and the danger of hemorrhage, it is not desirable to raise the blood pressure, and yet this is just what such a transfusion will do.

6. *Epidemic Disease Prevention.*—Whole-blood transfusion and serum by intramuscular injection are used to fortify the body against several specific ailments either before or after onset. An outstanding example is poliomyelitis. So far it has not been possible to show statistically that poliomyelitis immune serum has mitigated an epidemic or has prevented cases. The titer of immune bodies in any donor or in any pool of serum may be high; it may be low; it can be known only by determining its protective value for monkeys.

CONDITIONS IN WHICH TRANSFUSION IS CONTRAINDICATED:

1. *Uncomplicated Anemias Due to Lack of Iron.* This is a very common condition at all ages and particularly in infancy. Patients with a hemoglobin of 50 or 40 per cent, or even lower, do not need to be transfused. The administration of sufficient quantities of inorganic iron compounds by mouth for a moderate length of time will restore the hemoglobin of these patients to a normal condition. Of course, the main cause of the defect will have to be corrected.

2. *Pneumonia With Embarrassed Circulation.*—This has already been mentioned, and the reason stated why it is wrong to force more blood into an already overworking heart. The withdrawal of blood—that is, venesection—is probably better.

3. *Nephritis.*—Most patients with chronic nephritis look anemic, but are only moderately so. Patients with nephrosis have a surprisingly good blood count. Their white appearance is due to edema of the skin or perhaps to a capillary constriction. Plasma proteins are, of course, frequently abnormally low, and a transfusion of normal plasma has been used to combat edema, but without much success. The transfusion of whole blood does not help the condition of nephritis at all; in fact, it probably increases the load on the damaged kidneys to excrete the new substances which have been added. Transfusions in cases of nephritis someties have been followed by anuria.

4. *Recovery Stage of Infection.*—It has already been stated that here there are increased protein and platelets in the blood with increased tendency to coagulation, and that the addition of transfused blood at this time is somewhat dangerous. Sudden deaths have occurred for reasons difficult to explain. Transfusion is at least not necessary.

5. *Allergy.*—When transfusing a patient who is highly sensitive to certain proteins, it must be care-

fully ascertained that the blood of the donor does not offend by containing these proteins, which it may do at all times, and particularly after the donor has just eaten.

6. *Acidosis.*—A patient in this condition has abnormal substances in the blood which are excreted as organic acids. These substances are known to cause increased precipitation of hemoglobin; and, therefore, such a patient should have the acidosis corrected before transfusion of blood is given. Particularly should fluid be given to such a patient, and the acidosis and anhydremia corrected before the patient's blood is matched against donors, as the results may be different under these altered conditions.

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III. METHODS OF TRANSFUSION

CLIFFORD SWEET, M.D. (2940 Summit Avenue, Oakland).—Two methods of blood transfusion are in general use in the care of infants and children, namely, the transference of whole blood from the donor to recipient by the Lindemann multiple syringe method, and the indirect method by which the donor's blood is collected and mixed with sodium citrate solution, and then given after varying intervals of time to the patient by gravity or syringe, intravenously, intra-abdominally, or even subcutaneously.

The advantages of the multiple syringe method are not great, since there is no proof that the immediate transfer of undiluted blood from donor to patient is of any greater benefit than a corresponding amount of blood which has been citrated. On the other hand, the technical difficulties of this method are numerous when compared with the indirect, citrate method: (1) The multiple syringe method requires two skilled operators who can work together as a team, a nurse who can pass the syringes to both operators in a satisfactory manner, and a second nurse or orderly who can hold the patient if he is refractory, while a third unscrubbed nurse should also be present in case of need. When the citrate method is used, the blood can easily be collected by one operator with the assistance of one nurse, and can usually be given to the patient later by the same two persons. (2) In order to avoid any possibility of transferring infection from the patient to the donor, enough syringes must be provided so that each syringe is used only once; while if citrated blood is injected by the syringe method, only two syringes are needed—one to be filled by the nurse, while the other is being emptied into the patient's vein. (3) A much greater degree of skill is required to keep a needle in the lumen of a vein, while numerous syringes are being attached and disconnected, than when the needle is merely held in place while blood is flowing from the donor into a partial vacuum flask containing citrate, or when it is flowing into the vein of a patient (especially a small child) by gravity. (4) A transfusion of undiluted blood must be done quickly in order to avoid clotting, and in certain instances it may be undesirable, if not dangerous, to suddenly increase the volume of the circulating blood in a very young, acutely ill, or feeble patient, such as a child with pneumonia, a feeble or premature infant, or a child with a congenital heart disease, while a citrated blood transfusion can be given as slowly as need may dictate, even by the continuous intravenous drip method. Also the danger from reaction is reduced when the blood is introduced more slowly. (5) While it is possible to set up for a transfusion of undiluted blood in the patient's room when he cannot be taken to the operating room, it is much simpler to take citrated blood to the patient and give it as one would any other fluid by vein. (6) Citrated blood can be taken from the donor in sufficient amount at one time for two or more transfusions on successive days, provided it is kept in storage at low temperature.

Despite all the advantages of the citrate method, the writer prefers to use the multiple-syringe method of giving undiluted blood whenever possible.

However skillful the operator may be, he may fail if he does not give careful attention to the needles he uses. If the needle has a long, spear-type point, the danger of piercing the posterior wall of the vein is greatly increased. The bevel of the point should not exceed 60 degrees, and the needle should be sharpened to a razor-edge on a fine stone. The point should not only be sharp with cutting edges, but narrow enough to pick up and transfix the outer wall of the child's small, movable vein; the lumen of the needle should be as smooth as possible, and to insure this it should be thoroughly polished with fine dampened emery, or other abrasive material, carried upon the largest possible adapter. A short needle is much better than a long one since it is easier to aim accurately at short range than at long. Introducing the needle until the hilt is pushed firmly against the overlying skin assists greatly in keeping the needle in place. Since I learned several years ago, from Dr. A. H. Ziler of Los Angeles, to thus "lock" the needle in place, I have had very little difficulty in staying in the lumen of even very small veins. A Fordyce wing, which is readily attached to any needle after the manner of an adapter, gives one a firm handle for holding the needle in place, and I prefer to introduce the needle into the vein with only the wing attached, rather than to do so with the needle mounted on a syringe.

The skin is anesthetized with one per cent procain at the chosen site, the needle is introduced through the skin at an acute angle, and the vein is then fished for until the point engages the outer wall sufficiently for the vein to follow trial movements of the needle, after which the base of the needle is depressed until it is nearly parallel with the skin, and then moved forward in the lumen of the vein until the hilt brings the skin taut in the line of entrance. During the forward movement of the needle, the wing is held as one holds a pen or a scalpel, since any rigidity in the operator's hand greatly increases the probability of going through the vein rather than along the lumen.

If syringes are used, they should be held with the hand relaxed until connected to the needle, and then the connection made firm by clockwise rotation of the syringe. Detachment should be accomplished

by short counter clockwise rotations of the syringe, thus avoiding pushing or pulling on the needle.

The sites for transfusing infants and children are several, namely, the scalp veins, the jugular, the anterior cubital at the elbow, the internal saphenous, just anterior to the internal malleolus of the tibia, and the superior longitudinal sinus. The last-mentioned should not be used, but if one has the temerity to choose this route, he should use the citrate method and introduce the blood only under the lowest possible pressure of gravity.

The scalp veins in infants can often be used for the introduction of citrated blood under syringe pressure. The jugular vein is often the easiest one to use in infants, and even older children, provided the head is held firmly, fully extended over a sand bag or the end of the table, and at the same time strongly rotated laterally in order to prevent the jaw acting as an obstruction to a direct line of approach; and, most important of all, that the needle be introduced along the lumen of the vein for a great enough distance, preferably about an inch, so that the movements produced by the child's breathing and crying will not lift the vein off the needle.

The internal saphenous at the ankle must be exposed by cutting down upon it under local anesthesia in very young infants, nicking it with a knife-point or a small, sharp-pointed pair of scissors, and introducing a blunt needle or a fine canula into it, through which citrated blood can be readily given. This is the best site and method for transfusing new-born infants, and if faced with the necessity of cutting down on the vein of an older child, scarring at this point is least objectionable. A considerable number of older children who have very small arm veins, or whose arm veins are obscured by subcutaneous fat, present an ankle vein which can be readily entered by a needle puncture—provided the needle is very sharp. A few infants and most older children have arm veins which can readily be used for transfusion.

The proper use of a local anesthetic is important in order to reduce the struggles of the child and to prevent the operator from hurrying to get the needle well placed in the lumen of the vein. Haste at this point usually means failure. Also the child's arm *must not move* during the transfusion. I suppose the arm could be fastened to a splint, although I have not used this method. The child should be completely restrained, by firm wrapping in a blanket, leaving only his head and the arm to be used exposed. A small sand bag or folded towel should be placed under the child's elbow, in order to extend the arm fully. A nurse should then be seated on a stool beside the head of the table, and instructed (the best method of instruction is demonstration by the operator) to grasp the child's shoulder firmly in her hand with the fingers spread fanwise over the patient's scapula, and the thumb placed *emphatic,* exactly over the acromian process. With this hand the patient's shoulder is held firmly against the table; with the other hand she takes a firm grip on the patient's free hand from beneath with her thumb across his palm and the patient's thumb under her palm. She must not only fully extend the patient's elbow and prevent any flexion, but she must also prevent any rotation of the forearm. If the particulars of the above-described hand grip are not fully observed, rotation of the forearm, with dislodgement of the needle from the lumen of the vein, will almost certainly result. Proper placing of the nurse in a comfortable posture, with the elbow of her hand holding the arm well flexed and resting on her knee, or on a table or stool, will enable her to hold the child's arm motionless for a sufficient time, while she will be entirely out of the way of the operator, who is seated on the opposite side of the child's arm. I am indebted to Dr. Q. O. Gilbert of Oakland for this most excellent way of holding the patient's arm.

One other small detail of technique, attention to which raises the percentage of successful transfusion greatly, is the placing of the tourniquet just tight enough to fully distend the vein to be used, but without interfering with the continuance of circulation. Even though several readjustments must be made, time is eventually saved and failure will less often result.

Use of Benzedrine Sulfate in Seasickness.—Hill examined one hundred cases of seasickness. Except as conditions of hypertension, cardiac disease and unusual degrees of excitability contraindicate the use of benzedrine sulfate, these cases were taken consecutively as they presented themselves. The group comprised eighty-two women and eighteen men. Their average ages were 36.6 and 33.2, respectively. Satisfactory results were obtained in thirty-nine cases, in all of which the improvement was unequivocal, every likely fallacy having been carefully excluded. Those responding to benzedrine alone showed a mean pulse rate of 69 recumbent, increasing by 18 per cent on sitting up; in the group of failures the corresponding figures were 77 and 11 per cent; that is to say, a tendency to vagotonia predominated in the first group. It is doubtless in the vagotonic variety of seasickness that benzedrine finds its greatest usefulness. In its mode of onset this sickness reproduces in slow motion the prologue to an attack of syncope. The clinical signs point to a disturbance of the stabilizing control of the circulation whereby the effects of low arterial pressure are neutralized by tachycardia, and vice versa. Doubtful cases numbered forty. This group comprised not only those of whom it was doubtful whether they had improved, but also those concerning whom there was any room for doubt as to how improvement had been brought about. Psychologic factors were reckoned with. Analysis of the twenty-one cases which failed to respond to benzedrin shows that most cases of seasickness are amphotonic. In some cases of extreme vagotonia the dosage (usually from 10 to 20 milligrams) was apparently not adequate; insufficient attention was paid to the influence of constipation. A study of the data provided here described yields two generalizations regarding the action of benzedrin. (1) When euphoria has resulted, the subsequent depression is insignificant in degree and duration compared with the preceding exaltation; probably the reaction coincides with the period of sleep. (2) The effects appear rapidly but are long-continued, as if a succession of interdependent physiologic changes had been initiated by the action of the drug. The rapid effect on gastric spasm, suggesting a local action, is obviously of great value in seasickness. It is remarkable how seldom benzedrin is vomited, even by patients who have openly despaired of being able to retain it. Enthusiasm for a new drug must be tempered with sound skepticism and the results scrutinized with care. For the suppression of sympathetic activity, especially that associated with dread of seasickness, bromids rank high. Benzedrin sulfate has great possibilities of usefulness in certain cases of seasickness in which there are signs of excessive vagus activity.—*British Medical Journal.*